AMENDMENT TO THE CLAIMS

Please amend the presently pending claims as follows:

1.(Currently Amended) A method comprising steps of:

(a) determining an actuator state;

(b) responsive to the actuator state being a settle state, providing constants for a settle controller;

(c) responsive to the actuator state being a follow state, providing constants for a follow controller; and

(d) generating a control output using the constants provided in step (b) or (c) based on whether a position error signal running average exceeds a running threshold.

2.(Original) The method of claim 1 wherein providing the constants for the follow controller includes selecting a first controller from a plurality of controllers, wherein the first controller is optimized for a first performance requirement.

3.(Original) The method of claim 2 wherein the first performance requirement is one of rotational/linear vibration and non-repeatable runout.

4.(Currently Amended) The method of claim 2 wherein selecting a first controller from a plurality of controllers includes:

~~determining a position error signal running average;~~

~~determining whether the position error signal running average exceeds a predetermined threshold; and~~

responsive to the position error signal running average exceeding [[a]] the predetermined threshold, selecting the first controller, wherein the first performance requirement is rotational vibration.

5.(Currently Amended) The method of claim 4 wherein selecting a first controller from a plurality of controllers includes:

applying a low pass filter to [[the]] a position error signal before determining [[a]] the position error signal running average.

6. (Currently Amended) The method of claim 1, further comprising:

determining a controller state [[a]] for the settle, track follow controller.

7.(Original) The method of claim 6 wherein the controller state is determined using the following state equation:

$$x(k+1) = Ax(k) + Bu(k),$$

where $x(k+1)$ is an n-dimensional controller state vector for a time $k+1$, $u(k)$ is an input to the controller, and A and B are constant matrices of appropriate dimensions.

8.(Original) The method of claim 7 wherein the control output is generated using the following equation:

$$y(k) = Cx(k) + Du(k),$$

where $y(k)$ is an output for the settle, track follow controller and C and D are constant matrices of appropriate dimensions, including the constants provided in step (b) or (c).

9.(Original) The method of claim 1 wherein providing constants includes providing a reference to a storage location for the constants in a memory.

10.(Currently Amended) A method for optimizing a controller, comprising steps of:

(a) determining an actuator state;

(b) responsive to the actuator state being a settle state, providing constants to control the controller as a settle controller;

(c) responsive to the actuator state being a track follow state, providing constants to control the controller as a track follow controller; and

(d) generating a control output using the constants provided in step (b) or (c) based on whether a position error signal running average exceeds a running threshold.

11.(Original) The method of claim 10 wherein providing constants for the track follow controller includes selecting a first controller from a plurality of controllers, wherein the first controller is optimized for a first performance requirement.

12.(Original) The method of claim 11 wherein the first performance requirement is one of rotational/linear vibration and non-repeatable runout.

13.(Currently Amended) The method of claim 11 wherein selecting a first controller from a plurality of controllers includes:

~~determining a position error signal running average;~~

~~determining whether the position error signal running average exceeds a predetermined threshold; and~~

responsive to the position error signal running average exceeding [[a]] the predetermined threshold, selecting the first controller, wherein the first performance requirement is rotational vibration.

14. (Currently Amended) The method of claim 13 wherein selecting a first controller from a plurality of controllers includes:

applying a low pass filter to [[the]] a position error signal before determining [[a]] the position error signal running average.

15. (Original) The method of claim 10, the method further comprising:

determining a controller state for the settle, track follow controller.

16. (Currently Amended) An apparatus comprising:

(a) at least one actuator;

(b) a memory; and

(c) a shared state controller, operatively coupled to the at least one actuator and the memory, to determine a controller state, select a first controller from a plurality of controllers based on whether a position error signal running average exceeds a running threshold, receive constants for the first controller from the memory, generate a control output using the constants, and provide the control output to the at least one actuator.

17. (Currently Amended) The apparatus of claim ~~19~~ 16 wherein the first controller is optimized for a first performance requirement.

18. (Currently Amended) The apparatus of claim ~~20~~ 17 wherein the first performance requirement is one of settle, rotational/linear vibration, and non-repeatable runout.

19. (Currently Amended) The apparatus of claim ~~19~~ 16 wherein the

controller state is determined using the following state equation:

$$x(k+1) = Ax(k) + Bu(k),$$

where $x(k+1)$ is an n-dimensional controller state vector for a time $k+1$, $u(k)$ is an input to the controller, and A and B are constant matrices of appropriate dimensions.

20. (Currently Amended) The apparatus of claim ~~22~~ 19 wherein the control output is generated using the following equation:

$$y(k) = Cx(k) + Du(k),$$

where $y(k)$ is an output for the settle, track follow controller and C and D are constant matrices of appropriate dimensions, including the constants provided in step (b) or (c).